

the corpuscular radiation is small. For a slightly more penetrating primary beam a rapid increase in the intensity of both the secondary Röntgen radiation and the corpuscular radiation takes place. This seems to suggest that the production of corpuscular radiation is in some way intimately associated with the emission of the Röntgen type of radiation.

(2) I had recently shown that when homogeneous radiation falls upon a thin layer of a substance which may act as a secondary radiator, a portion is transmitted unchanged, and that the fraction of the remaining energy which is transformed into secondary Röntgen radiation *decreases* as the primary beam becomes more penetrating. In the present experiments it is found that the corresponding fraction of the remaining energy which is transformed into corpuscular radiation *increases* as the primary beam becomes more penetrating.

(3) The corpuscular radiation emitted by these metals when subjected to homogeneous beams is itself surprisingly homogeneous, whether the exciting beams are "soft" or very "hard."

(4) The absorption coefficients of the corpuscular radiation from a given metal excited by homogeneous secondary Röntgen radiation vary with the nature of the exciting radiation. These absorption coefficients are a decreasing linear function of the atomic weight of the secondary radiator.

I hope to publish further details of these experiments shortly.

CHARLES A. SADLER.

George Holt Physics Laboratory,
Liverpool University.

Drought in South-west Ireland.

THE deficiency of rainfall in the south of Ireland, to which Mr. Armstrong refers in *NATURE* of October 21 (p. 487), has been apparent in the annual total rainfall for the last three years, the deficiency also affecting the south-west of England. At the same time, there has been a marked excess of rainfall in the north of Ireland, deficiency and excess being taken as synonymous with quantities below and above the average of many years. It is frequently found that parts of the country, often quite narrow strips, show a marked deficiency of rainfall for several successive years, and afterwards revert to an average condition or show an excess. The most probable explanation seems to me to be a change, perhaps a slight one, in the prevailing tracks of the centres of barometric minima, but I have not found data in a form suitable for testing the truth of the suggestion.

The extreme dryness of August was experienced over a large area of the south of Ireland, less than half an inch of rain having fallen over about 2800 square miles. In September less than half an inch fell over not more than 500 square miles.

I may perhaps be excused for pointing out that while Mr. Armstrong uses "absolute drought" to describe a period of twenty-four hours without rain, it has been usual for many years to reserve the words "absolute drought" for a period of more than fourteen consecutive days without recorded rainfall.

HUGH ROBERT MILL.

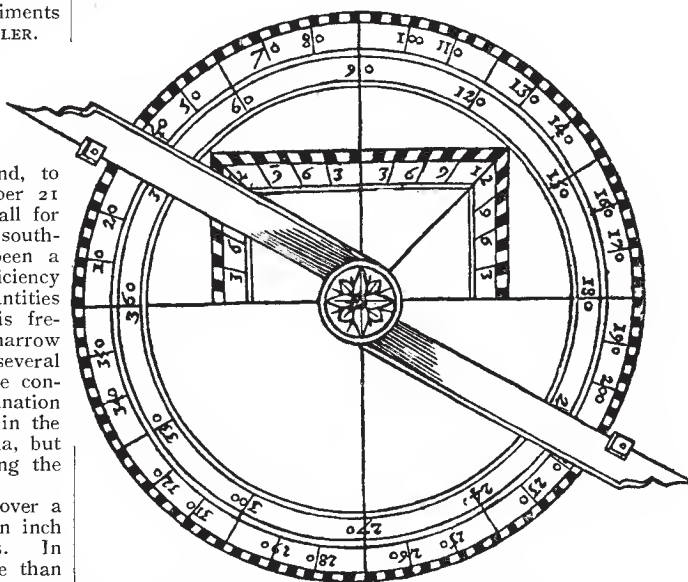
62 Camden Square, London, N.W., October 25.

Derivation of the Word "Theodolite."

ALTHOUGH the etymology of the word theodolite has been discussed from time to time,¹ no satisfactory solution has hitherto been established. It was first used in England, and the earliest reference to it is contained in a book by Leonard Digges (completed and published by his son, Thomas) called "Geometrical practical treatise, named Pantometria, divided into three bookes, longimetria, planimetria, and stereometria, &c.," first pub-

lished in 1571, with a second edition in 1591, wherein the "composition of the instrument called Theodelitus" is represented as a "circle diuided in 360 grades or degrees, or a semi-circle parted in 180 portions"; or again, "the composition also of the Square and Planisphere or Circle named Theodelitus for measuring lengths, breadths, and distances." It had a "double scale," an "index," "the sightes," and the circle was 2 feet in diameter, and "fastened in the top of some staffe." He does not state how the name was derived, and spells it "theodelitus" and "theodolitus" alternately. William Bourne ("Treasure for Travellers," 1578) named the same instrument "horizontall or flatte sphere," and not theodelitus; but when he speaks of the alidade he calls it only once *alideday*, but otherwise always *athelida*. After this de Morgan, who first discussed the derivation in the *Philosophical Magazine*, concluded that the "theodelited circle" of Digges, who, however, does not use that adjective, and "athelidated circle" of Bourne, were various corruptions of the Arabic word *al-idhāda* (a sort of rule), from which the word *alidade*, which carries the sight or telescope of a theodolite, is derived.

It has been suggested by various writers that theodolite is derived from the Greek roots *θεᾶ* (sight), *ὁδός* (the way), and *λίθος* (a stone), for the latter root *λίτός* (smooth) being



Reproduction of Digges' illustration of his "Theodelitus." From the *Zeitschrift für Vermessungswesen*.

substituted by others; also from *θεᾶω* (I see) and *δολῖχος* (long). Another suggested derivation is the English article "the" combined with the Arabic "*alidhada*."

In searching for a more satisfactory solution, the idea occurred to the writer that the word would naturally be compounded to represent the principal parts of the instrument, and when reading Prof. E. Hammer's latest and most interesting discussion in the *Zeitschrift für Vermessungswesen*, vol. xxxvii. (1908), pp. 81-91 and 113-25, he was impressed by one of the illustrations reproduced of Digges' "theodolitus" and description of it, with special mention of the words "sightes," "index," and "double scale." He would submit, therefore, that the true etymology is from the Greek words *θεᾶ*=a sight; *ὁδός*=any pointed instrument; *λίθος*=a circle or a fellow of a wheel. These Greek words appear to be those which would actually denote the three essential parts of the instrument, viz. the sight, the index arm, or alidade (Digges uses the word index, never alidade), which is represented as a pointed instrument, and the limb of graduated circle. The spaces on the circle appear like the

¹ *Philosophical Magazine*, vol. xxviii. (1846), note by de Morgan, pp. 287-9. *Poggendorff's Annalen*, vol. cxxxiii. (1868), pp. 192, 349. *Zeitschrift für Vermessungswesen* (1880), p. 55; (1883), p. 321; (1908), pp. 81-91 and 113-25. *Vogler's Praktische Geometrie* (1884), p. 361. *Proc. Inst. C.E.*, vol. clxxiii. (1907-8), p. 330. *Preussische Jahrbücher*, note by Prof. Didolf, vol. cxvi. (1904), pp. 362-4.

felloes of a wheel. This derivation corresponds with Digges' description of the instrument.

E. H. V. MELVILL.

203 and 204 New Stock Exchange Buildings,
Johannesburg, Transvaal, September 27.

A Supposed New Mineral.

A SPECIMEN of a mineral, forming portion of a mass stated to have been found in the basalt of Co. Antrim, was recently sent for identification to the office of the Geological Survey of Ireland by Mr. S. B. Wilkinson, the senior geologist, to whom it was handed by the finder. As it presents some peculiar features, and appears to be new to science, we take this opportunity of recording its occurrence. The complete examination of the mineral will necessarily occupy some time.

The mineral strongly resembles cobaltite in appearance. Its lustre is metallic, hardness about six. It breaks with a surface which under the microscope shows a finely conchoidal structure. When etched with an acid a crystalline structure becomes apparent; it is fusible with difficulty, but in the oxyhydrogen flame it melts without apparent alteration. Heated in a closed tube it does not yield any sublimate.

When the mineral is powdered, or even its surface scratched, it emits an odour like that of acetylene prepared from commercial calcium carbide. Hydrofluoric acid dissolves the mineral, the other acids have little effect upon it, while it is readily decomposed by fusion with the alkaline hydroxides.

A preliminary chemical analysis shows that the mineral is essentially a compound of iron, silicon, and carbon.

RICHARD J. MOSS.

HENRY J. SEYMOUR.

Laboratory, Royal Dublin Society, October 20.

The Pitcairn Islanders.

WHEN reading Mr. M. J. Nicoll's "Three Voyages of a Naturalist" a short time ago, I came across the following passage on p. 211 in the chapter on Pitcairn Island:—

"The older people, as well as the younger children of Pitcairn, have fair complexions, but the people of from thirty to fifty years of age are quite as dark as the average Polynesian. It appears from this that the Pitcairners resemble their ancestors, the 'Bounty' mutineers, every alternate generation."

It may be remembered that in 1790 nine mutineers, six native men, and twelve native women sailed from Tahiti to Pitcairn; the native women killed the native men, and by 1800 only one British sailor was left, from whom the present inhabitants are descended.

Just before the above extract Mr. Nicoll tells us that "Lord Crawford paid a visit to the two oldest inhabitants . . . both of whom are grandchildren of the original mutineers." So we see that the grandchildren and the great-grandchildren were fair, resembling the British men, while the great-grandchildren were dark, resembling the native women. That is to say, that F_2 and F_4 generations resembled the σP_1 , while F_3 generation resembled the σP_1 .

These facts struck me as being particularly interesting, as experiments of this nature in human heredity are difficult to obtain. Perhaps some "Mendelist" may be able to use or explain them.

C. B. WILLIAMS.

Clare College, Cambridge, October 14.

The Auroral Display of October 18.

I WAS very much interested in Mr. Harcourt-Bath's letter describing an auroral display which he saw from the Cotteswold Hills.

From West Kirby Hill, on the Wirral, I noticed a luminous band low down on the horizon, with upward streamers and "a detached red, cloud-like portion" rather north of west.

What struck my attention, however, was that behind this red patch there were dark clouds, at no great altitude, faintly illuminated on the underside by the aurora.

As the red colour outlasted the streamers by several minutes, I was brought to the conclusion that it was independent of the auroral display.

However, in view of Mr. Harcourt-Bath's letter, I am led to ask you if observers have ever thought that an aurora could be comparatively close to the earth, and not of necessity in the "highly rarefied layers of the air"?

ERNEST J. BATY.

"Nunclose," West Kirby, Cheshire.

It may interest Mr. Harcourt-Bath to know that the auroral display of October 18 was strikingly visible at Dudley. At 9.15 p.m. there were six or more broad beams of white light of unequal lengths and widths. These sprang normally from a broad circular arc resembling a "Milky Way" in luminosity and a broad rainbow in shape and size.

The central vertical beam was the brightest, widest, and longest, extending vertically about 45° , but not terminating definitely; it was about 10° W. of N.

The broad arched base appeared to cross through Ursa Major, the vertex being about 20° above the horizon, and was not uniformly bright. About 9.30 p.m. the left-hand (W. of N.) half of the base became a soft violet light; the right-hand portion remained white, but grew fainter.

W. AUSTIN MORLEY.

14 Park Road, Dudley, October 26.

The Occurrence in India of the Pappataci Fly (*Phlebotomus papatasi*).

THE rôle nowadays assigned to *Phlebotomus papatasi* in the transmission of a certain type of fever (see "Das Pappataciefieber," 1909, by Drs. Doerr, Franz and Taussig) makes the geographical distribution of this little fly a matter of practical importance. It is therefore interesting to note that this species is common in certain parts of northern India. Some time ago Mr. F. M. Howlett, second imperial entomologist, sent me specimens from Rawalpindi, in the Punjab, and Pusa, in Bihar, which I identified as belonging to a species allied to *P. papatasi*. Through the kindness of Dr. J. H. Ashworth I have now been able to compare some of these specimens with European examples of *P. papatasi* in the zoological laboratory of the University of Edinburgh. I can find no difference except that the Indian specimens are perhaps slightly smaller than the European ones. The former agree as regards venation, genitalia, &c., with Grassi's beautiful figures ("Ricerche sui Flebotomi," 1907).

In addition to *P. papatasi*, six Indian species of *Phlebotomus* are now represented in the collection of the Indian Museum. They will be fully described shortly.

N. ANNANDALE.

The Mansfield Automatic Water-finder.

WITH reference to Mr. A. A. Campbell Swinton's letter in regard to Mansfield's water-finder, which appears in NATURE of October 14, it may be of interest to state that I made inquiries from Messrs. Mansfield and Co. in May, 1908, asking for the names of the "leading scientists and engineers" who, as they stated, "vouched for the successful application of the invention"; they did not send me any names, but allowed a friend of mine in Liverpool to call to see the documents. One was from an architect in Liverpool, another from a firm of well-borers, and there were some foreign ones, but none were produced that were signed by persons whom I should describe as "leading scientists and engineers."

I may add that I expressed my willingness to test their instrument, but one was not placed at my disposal.

J. WERTHEIMER.

Merchant Venturers' Technical College, Bristol,
October 20.